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Report on a Collection of Bethylidae (Hymenoptera) from Central Florida, USA, with Description of a New Species of *Lepidosternopsis* Ogloblin

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Abstract.—Sixty species of Bethylidae of the genera *Acrepyris* Kieffer, *Allobethylus* Kieffer, *Apenesia* Westwood, *Anisepyris* Kieffer, *Bakeriella* Kieffer, *Cephalonomia* Westwood, *Dissomphalus* Ashmead, *Epyris* Westwood, *Goniozus* Förster, *Holepyris* Kieffer, *Laelius* Ashmead, *Lepidosternopsis* Ogloblin, *Plastanoxus* Kieffer, *Prorops* Waterston, *Prosierola* Kieffer, *Pseudisobrachium* Kieffer, *Rhabdepyris* Kieffer, and *Sclerodermus* Latreille were collected, primarily in Malaise traps, at 12 sites in Orange Co., 3 in Seminole Co., one in Osceola Co. and one in Volusia Co., Florida, USA. *Lepidosternopsis* is recorded for the first time from the Nearctic Region and ***Lepidosternopsis irradiata* Lanes and Azevedo, sp. nov.**, is described and illustrated. The male of *Lepidosternopsis* is described for the first time. Taxonomic comments for some species are included.

There are about 2,000 species of Bethylidae worldwide, 204 of which are recorded from the Nearctic Region. The few species whose biologies have been investigated are idiobiont, or incipient koinobiont, ectoparasitoids (Finnamore and Gauld 1995). They parasitize larvae of Coleoptera or Lepidoptera that live in cryptic situations. Most Bethylinae parasitize microlepidopterans, whereas most Pristocerinae and Epyrinae attack beetles, especially those inhabiting wood or seeds (Evans 1964).

In the United States, Florida possibly has the richest bethylid fauna. Beginning in 1990, biologists at the University of Central Florida surveyed the arthropod fauna of the campus (Evans and Fullerton 1997) and other adjacent sites. Evans and Fullerton (1997) studied an assemblage of 52 species of Bethylidae, based on approximately 3,000 specimens from Central Florida. We have studied an equally large second assemblage of Bethylidae in order to better understand the fauna of this state.

Our goal was to survey the Bethylidae of Florida, to establish range extensions and to analyze the taxonomic variation of the studied species. The specimens we studied represent 60 species, 18 of which are different from the 52 recognized by Evans and Fullerton (1997). Five genera: *Allobethylus* Kieffer, *Cephalonomia* Westwod, *Lepidosternopsis* Ogloblin, *Plastanoxus* Kieffer, and *Prorops* Waterston were not observed by Evans and Fullerton (1997). Some species occurred in remarkable numbers, for example 739 males of *Pseudisobrachium flaviventre* (Kieffer). *Lepidosternopsis* is recorded for the first time from the Nearctic Region based on a new species, which we describe in this paper.

TERMINOLOGY

Terminology generally follows Evans (1964). The nomenclature of integument sculpture follows Harris (1979). The terminology of wing cells and veins follows Gauld and Bolton (1988). Abbreviations used for the description of the new species are: DAO, diameter of anterior ocellus,

measured in frontal view; HE, height of eye, measured in lateral view, across its maximum height; LFW, length of fore wing; LH, length of head, measured in frontal view, from the vertex crest to the median apical margin of the clypeus; OOL, ocello-ocular line, measured in latero-dorsal view, the shortest distance from the eye top to the posterior ocellus; VOL, vertex-ocular line, measured in lateral view, the distance from the eye top to vertex crest; WF, width of frons, measured in frontal view, its minimum width; WH, width of head, measured in frontal view, its maximum width including the eyes; WOT, width of the ocellar triangle, measured in frontal view, the maximum width, including the ocelli.

COLLECTION SITES

The material examined is deposited at the Entomological Collection of the University of Central Florida, Orlando (Stuart M. Fullerton). It was collected using Malaise traps, pit fall traps, UV light traps, and sweeping between 1997 and 2000 in 18 sites in Central Florida in Orange, Seminole, Osceola, Sarasota and Volusia Counties. The collection sites are referred to by number in the list that follows.

1. Seminole Co., Econ Wilderness Area. Scrub Oak/Saw Palmetto (burned).
2. Seminole Co., Econ Wilderness Area. Scrub Oak/Saw Palmetto (unburned).
3. Seminole Co., Oviedo.
4. Orange Co., LK Tibet- Butler Preserve/Scrubby Flatwoods.
5. Orange Co., Orlando, Tibet Preserve Myrtle Oak Scrub.
6. Orange Co., Walt Disney World. C- 4 Stout Site S15, 16 T24S R27E. Xeric Oak/Flatwoods.
7. Orange Co., Walt Disney Wolrd. MW-5 (unburned) S16 T24S R27E. Sand Pine/Oak Scrub.
8. Orange Co., Walt Disney World. MW-7 (unburned) S22 T24E. Sand Pine/Oak Scrub.
9. Orange Co., Orlando. UCF, Mackay Tract, Swgrass Marh. Red Maple.
10. Orange Co., Orlando. UCF, Cypress Forest.
11. Orange Co., Orlando. UCF, Long Leat Pine Sand Pine Turkey Oak.
12. Orange Co., Orlando. UCF, Long Leat Pine Saw Palmetto.
13. Orange Co., Orlando. UCF, Maidencane Marsh.
14. Orange Co., Orlando. UCF, Pond Pine Comm. Dahoon Holly.
15. Orange Co., Orlando. UCF, Sand Pine Rosemary Scrub.
16. Osceola Co. Walt Disney World. World Drive/US 192 S01 T25S R27E. Sand Pine/Rosemary Scrub.
17. Sarasota Co., MCC-Venice Campus. Long Leaf Pine-Saw Palmetto.
18. Volusia Co., Daytona Beach. Urban-Beachside, Halifax-River.

LIST OF SPECIES

Eight species of Bethylidae are recorded for the first time from Florida. These are indicated with an asterisk (*). Listing of genera follows Evans (1978), with species of each genus listed alphabetically.

Subfamily Bethylinae

Goniozus columbianus Ashmead. 56♀, 1♂. Sites 1, 6, 9, 10, 11, 13, 14.

* *Goniozus complanatus* Evans. 3♀. Site 15.

Goniozus electus Fouts. 2♀. Site 13.

Goniozus flavipes Fouts. 20♂. Sites 1, 2, 6, 9, 16.

Goniozus floridanus (Ashmead). 5♀. Sites 9, 10, 11.

Goniozus fratellus Evans. 1♂. Site 13.

Goniozus gracilicornis (Kieffer). 2♂. Site 11.

Goniozus hortorum Brues. 130♀, 2♂. Sites 2, 6, 9, 10, 11, 13, 14, 15, 16.

Goniozus hubbardi Howard. 16♀, 2♂. Sites 9, 13, 14, 18.

Goniozus nigrifemur Ashmead. 98♀, 6♂. Sites 1, 2, 6, 8, 9, 10, 11, 13, 14, 16.

Prosierola bicarinata (Brues). 3♀. Sites 1, 4.

Subfamily Epyrinae

Allobethylus floridanus Evans. 7♀. Sites 9, 11.

Anisepyris analis (Cresson). 100♀, 39♂. Sites 1, 2, 6, 8, 9, 10, 11, 12, 14.

Anisepyris columbianus (Ashmead). 34♀, 26♂. Sites 6, 8, 9, 10, 11, 12, 14.
Anisepyris grandis (Ashmead). 25♀, 211♂. Sites 4, 5, 6, 8, 9, 10, 11, 12, 14, 15, 16.
Anisepyris subviolaceus Kieffer. 15♀. Sites 6, 8, 10, 11.
Bakeriella mira Evans. 6♂. Sites 9, 11.
Cephalonomia hyalinipensis Ashmead. 20♀, 2♂. Sites 1, 9, 10, 11, 14.
Cephalonomia perpusilla Evans. 11♂. Sites 9, 11, 14.
* *Cephalonomia quadiceps* Evans. 1♀. Site 6.
* *Cephalonomia conoplithori* Evans. 2♀. Site 9.
Epyris californicus (Ashmead). 19♂. Sites 9, 11, 14, 16.
* *Epyris corticinus* Evans. 19♀. Sites 9, 10, 11.
Epyris deficiens Krombein. 6♀, 77♂. Sites 9, 10, 11, 12, 14.
Epyris festivus Evans. 27♀, 10♂. Sites 9, 11, 12.
Epyris oriplanus Kieffer. 1♂. Site 6.
Epyris rufipes (Say). 18♀, 35♂. Sites 1, 11, 12, 14.
Epyris spissus Evans. 42♀, 33♂. Sites 6, 8, 9, 10, 11, 13, 14, 16.
Epyris tricostatus Evans. 7♀. Sites 9, 11.
* *Holepyris catalinae* Evans. 2♀. Sites 10, 11.
Holepyris floridanus (Ashmead). 12♀, 9♂. Sites 9, 10, 11, 12, 14, 17.
Holepyris graminis Evans. 28♂. Sites 2, 6, 10, 11, 12, 14, 16.
Holepyris habilis Evans. 7♀. Sites 9, 10, 14.
Holepyris lautus Evans. 1♀, 62♂. Sites 2, 6, 9, 10, 11, 12, 14, 15, 16.
Holepyris micidus Evans. 12♀. Sites 2, 9, 10, 11, 14, 15.
Holepyris subtilis Evans. 19♂. Sites 6, 10, 11, 12, 14.
Laelius centratus (Say). 13♀, 1♂. Site 7, 9, 10, 11, 13, 14.
Lepidosternopsis irradiata Lanes and Azevedo sp. nov. 3♂, 4♀. Site 9, 10, 11, 13, 14.
* *Plastanoxus laevis* (Ashmead). 1♂. Site 1.
* *Prorops absoleta* Evans. 2♂. Sites 9, 14.
* *Prorops nasuta* Evans. 6♀, 3♂. Sites 9, 10, 11.
Rhabdepyris amabilis Fouts. 55♂. Sites 6, 10, 11, 14, 16.
Rhabdepyris carolinianus Evans. 12♂, 2♀. Sites 8, 9, 11, 14, 15.
Rhabdepyris muesebecki Evans. 5♀, 80♂. Sites 9, 10, 11, 14.
Scleroderma macrogaster Ashmead. 24♀. Sites 3, 9, 11, 13, 14.

Subfamily Pristocerinae

Acrepyris armifera (Say). 2♀, 35♂. Sites 8, 9, 10, 11, 12, 14.
Acrepyris atra Klug. 3♂. Sites 1, 2, 11.
Acrepyris bridwelli Evans. 17♂. Sites 8, 11, 12, 14.
Acrepyris fraterna Evans. 2♀, 45♂. Sites 8, 9, 10, 11, 12, 14.
Apenesia parapolita Evans. 5♀, 130♂. Sites 6, 8, 9, 10, 11, 12, 14, 16.
Dissomphalus apertus Kieffer. 311♂. Sites 8, 9, 10, 11, 14.
Dissomphalus barberi Evans. 10♂. Sites 9, 11, 14.
Dissomphalus evansi Azevedo. 34♂. Sites 6, 8, 9, 10, 11, 12, 13, 14, 16.
Dissomphalus kansanus Evans. 2♂. Sites 6, 10, 11.
Dissomphalus krombeini Azevedo. 3♂. Sites 11, 14.
Pseudisobrachium arenarium Evans. 75♂. Sites 2, 5, 6, 7, 8, 11, 12, 14, 16.
Pseudisobrachium ashmeadi Evans. 10♂. Sites 11, 12, 16.
Pseudisobrachium carolinianum Evans. 77♂. Sites 6, 7, 16.
Pseudisobrachium flaviventre (Kieffer). 739♂. Sites 4, 6, 7, 8, 9, 11, 12, 14, 16.
Pseudisobrachium rufiventre (Ashmead). 25♂. Sites 1, 6, 7, 8, 11, 12, 14, 16.

NOTES ON INDIVIDUAL SPECIES

Some individuals of species in the new series from Florida presented previously unknown variation. In these cases, we comment upon them below in order to help better understand morphological variation within the species.

Acrepyris armifera (Say): males may have eyes with minute setae.

Anisepyris analis (Cresson): antennal segments III+IV can be 3.0X as long as thick.

Anisepyris columbianus (Ashmead): this species is similar to *A. williamsi* Evans in the color of legs and sculpture of the females, but the lower fovea of the mesopleuron of the former species is divided by a conspicuous septum, whereas in *A. williamsi* the lower fovea is not divided. Males of *A. columbianus* and *A. williamsi* have this septum top-flatted.

Anisepyris grandis (Ashmead): the septum of the lower fovea of the mesopleuron varies from narrow to thick in the females. The frons also varies in width. Males can have the head with green or

blue reflections, and some with reddish legs.

Cephalonomia conophthori Evans: the propodeal disc is 1.25X as long as wide.

Cephalonomia hyalinipennis Ashmead: some females are light castaneous and the head varies in length, some have the head longer or with side parallel behind the eyes.

Cephalonomia quadriceps Evans: this species was known from 3 males from Massachusetts, Maryland and North Carolina, USA.

Epyris corticinus Evans: this species was known from Virginia, Maryland and Pennsylvania, USA. In this series, some females have small scutellar pits.

Epyris deficiens Krombein: males can have poorly defined longitudinal striae.

Epyris rufipes (Say): some females can have the propodeal disc evenly striate and the median transverse vein not strongly oblique.

Goniozus columbianus Ashmead: males can have the head weakly coriaceous.

Goniozus complanatus Evans: this species was known only from Texas, USA.

Goniozus hortorum Brues: female heads vary in length, punctures size, frons texture, clypeus length, sculpture, and height of median carina of clypeus. Males can have the cubital vein 2.5X as long as wide.

Goniozus hubbardi Howard: the third antennal segment can be 1.5X as long as thick.

Goniozus nigrifemur Ashmead: females can have the antennae as short as in *G. emigratus*. Males can have the antennae reaching the vertex crest, the third antennal segment as long as thick, or the posterior carina of the propodeal disc well-indicated.

Holepyris catalinae Evans: this species was known only from Arizona, USA.

Holepyris graminis Evans: males can have the posterior groove of the pronotal disc weakly developed.

Laelius centratus (Say): females can have legs light castaneous.

Plastanoxus laevis (Ashmead): this widespread species is recorded for the first time from Florida.

Prorops obsoleta Evans: this species was known only from 2 males and 1 female from Trinidad.

Prorops nasuta (Say): in the Nearctic Region this species was known only from 1 male from California.

Pseudisobrachium arenarium Evans: the width of the male frons ranges from 1.30 to 1.40× height of eye and propodeal disc from 1.60 to 1.70× as long as wide.

Pseudisobrachium ashmeadi Evans: length of propodeal disc in the males can be shorter than in the type series, 1.26× as long as wide.

Pseudisobrachium flaviventre (Kieffer): in males the head varies from dark castaneous to black, the antennae from light to dark castaneous, the diameter of the anterior ocellus varies from 0.17 to 0.23× the width of the frons, and the mesopleuron with callus ill defined.

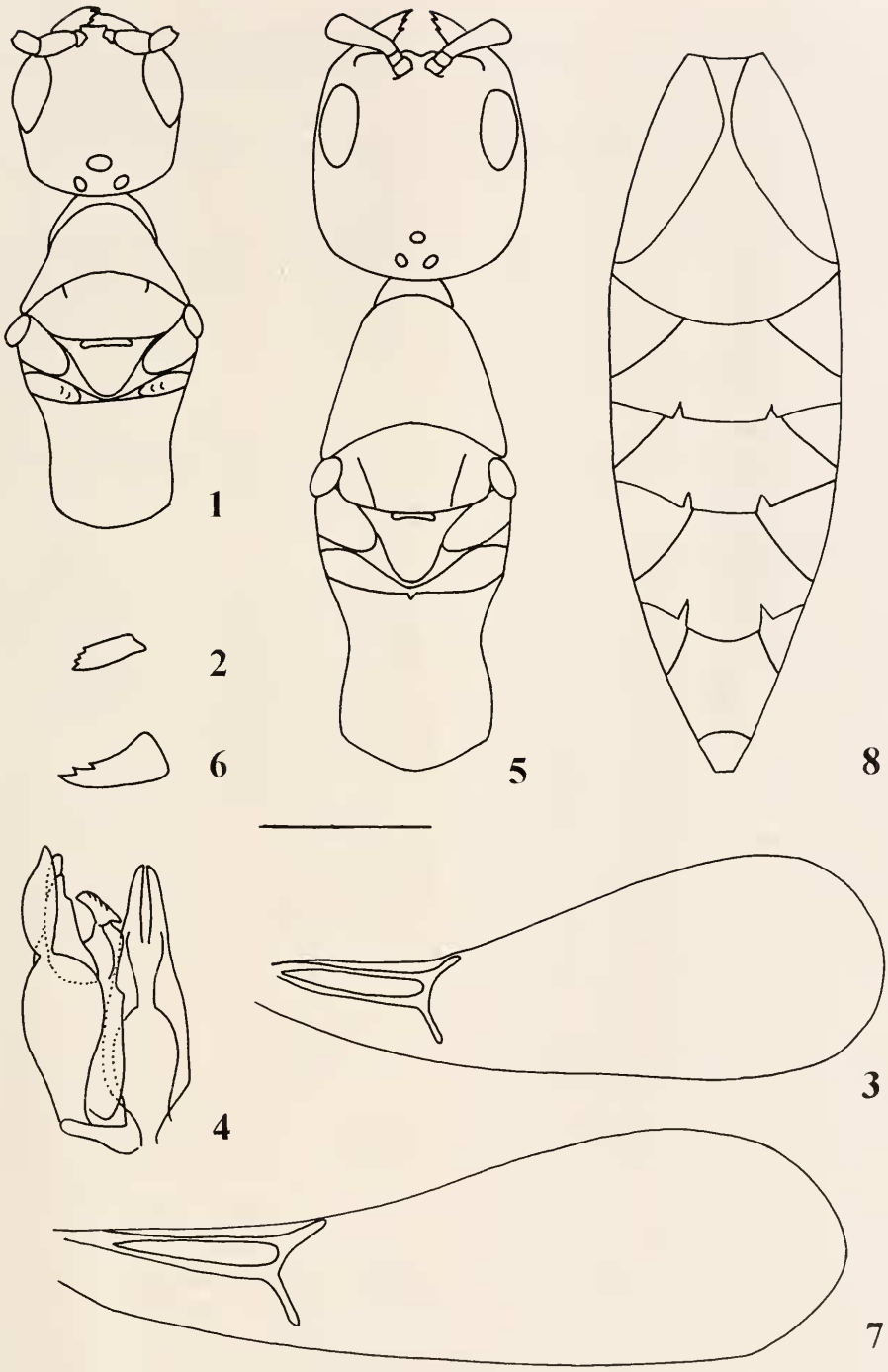
Psedisobrachium rufiventre (Ashmead): this species is very similar to *P. flaviventre*, differing by having the discoidal vein slightly conspicuous, the antennae with segments slightly longer and propodeal disc slightly longer. Males can have the mesopleuron with callus well defined.

Scleroderma macrogaster Ashmead: the pattern of body coloration shows a large range of variation, but with the metasoma constantly dark castaneous. The head can be dark castaneous, distinctly darker than the thorax; the thorax can be distinctly darker at the mesoscutum and mesopleuron, and the head and thorax can be evenly light castaneous.

Lepidosternopsis irradiata Lanes and Azevedo, sp. nov.

Figs. 1–8

Male holotype.—Body length 2.4 mm; LFW 1.6 mm. Color: Dark castaneous; an-



Figs. 1–8. *Lepidosternopsis irradiata* sp. nov. 1–4, Male. 5–8, Female. 1, Head and mesosoma, dorsal. 2, Mandible, frontal. 3, Forewing, dorsal. 4, Genitalia, ventral. 5. Head and mesosoma, dorsal. 6, Mandible, frontal. 7, Forewing, dorsal. 8, Metasoma, ventral. (Scale bars = 0.32 mm).

tenna, mandible, legs and palpi castaneous; wings hyaline, veins castaneous. Head (Fig. 1): Mandible with 4 apical teeth, the lower one relatively bigger and sharper (Fig. 2). Clypeus with truncate median lobe, with median carina concave in profile. First four antennal segments in ratio of 12:6:3:4; segment III 0.8× as long as thick; segment XI 1.6× as long as thick; antennal sockets closed to each other, separated by 0.3× their diameter. Eye with sparse, short setae. Frons weakly coriaceous, shinning, with small, very sparse punctures, with shallow and small groove between the antennal sockets. LH 1.08× WH; WF 0.58× WH; WF 1.12× HE; OOL 0.85× WOT; DAO 0.41× WOT; frontal angle of ocellar triangle acute; posterior ocellus distant from the vertex crest 0.5× DAO. Vertex slightly convex with corner somewhat angled. VOL 0.85× HE. Head not flattened, its thickness 0.62× LH. Mesosoma (Fig. 1): Thorax slightly coriaceous. Pronotal disc 1.25× as long as mesoscutum, with transverse carinae very weak. Notauli very weak, occupying anterior third of the mesoscutum; parapsidal furrow absent; scutellar groove slender. Propodeal disc 1.12× as wide as long, weakly coriaceous, shinning; without median and posterior carinae, with lateral carinae, lateral margins straight; declivity without median carina; propodeal spiracle totally directed outward. Mesopleuron weakly coriaceous, with wide, shallow foveae occupying nearly all surface, with a small central pit. Fore wing (Fig. 3) with veins Sc+R, Rs+M, M+Cu and 1Cu–a, forming only one closed cell (median). Fore femur 2.1× as long as wide. Median tibia not spinose. Claws simple. Metasoma: posterior margin of sternites IV-VI biemarginated. Hypopygium with posterior margin narrow and concave. Genitalia (Fig. 4): Paramere completely divided in two arms, ventral arm wide, with apex somewhat truncate in ventral half, dorsal margin convex, ventral margin straight, dorsal arm shorter than ventral, slender, with apex rounded; volsella with cuspis laminar, very wide, slightly shorter than paramere, ventral margin excavate in apical half; aedeagus bottle-shaped, progressively slender apically, apex emarginated, basal margin rounded.

Female.—Body length 2.8 mm; LFW 1.9 mm. Similar to male except: Color: Head and thorax castaneous, except the pronotum light castaneous and propodeum yellowish anteriorly; metasoma dark castaneous; antennae and palpi light castaneous; mandibles and legs castaneous; wings hyaline, vein light castaneous. Head (Fig. 5): Mandible with 3 apical teeth, the higher very shorter than lowers (Fig. 6). Clypeus very short, concave median lobe, with median carina weakly high and concave in profile. First four antennal segments in a ration of 25:8:4:4; segment III as long as thick; segment XI 0.7× longer than thick; antennal sockets close to each other, separated by 0.6× their diameter. Front very weakly coriaceous, shinning. Head globoid, 0.58× as high as long, LH 1.15× WH; WF 0.37× WH; WF 1.30× HE; OOL 2.06× WOT; DAO 0.3× WOT; posterior ocelli distant from the vertex 1.4× DAO. Vertex slightly convex, with corner somewhat angled. Temples slightly converging anteriorly. VOL 1.20× HE. Mesosoma (Fig. 5): Thorax coriaceous. Pronotal disc 1.72× longer than mesoscutum; notauli very weak and inconspicuous; parapsidal furrow, incomplete anteriorly, occupying more than half of the mesoscutum. Propodeal disc as long as wide, coriaceous, lateral margins concave anteriorly. Mesopleuron slightly coriaceous, with large and shallow fovea occupying surface, with small central pit. Fore wing as for male (Fig. 7). Fore femur 1.94× as long as wide. Metasoma: 1.73× as long as the mesosoma. Posterior margin of sternites IV-VI biemarginated (Fig. 8).

Type material.—Holotype ♂, USA, **Florida**: Orange Co., Orlando, University Central Florida, Cypress Forest, 2.VI.1999, Malaise trap, P. Russell and S. Fullerton

col. (deposited in Entomological Collection, University of Central Florida, Orlando). Allotype ♀, USA, **Florida**: Orange Co., Orlando, University Central Florida, MacKay Tract, Sawgrass Marsh, Red Maple, 14.VI.1999, Malaise trap, P. Russell and S. Fullerton col. Paratypes, USA, **Florida**: Orange Co., Orlando, University Central Florida: 1♂, Sawgrass Marsh, Red Maple, 13.IX.1999, Malaise trap, P. Russell and S. Fullerton col.; 1♂ and 1♀, LLP-Sand Pine, Turkey Oak, 7.XI.1997 and 2.VII.1997, Malaise trap, P. Russell and S. Fullerton col.; 1♀, Pond, Pine Comm., Dahoon Holly, 11.V.1999, Malaise trap P. Russell and S. Fullerton col.; 1♀, Maidencane Marsh, 17.V.1999, Malaise trap, P. Russell and S. Fullerton col.

Etymology.—The name refers to the absence of the radial vein in the fore wings.

Discussion.—The description of the genus *Lepidosternopsis* was based on an apterous female of *L. kuscheliana* Olgloblin, 1953, from Masatierra Island (Chile). Evans (1964) described two species based on micropterous females from Australia. Azevedo (1999) described the first macropterous species of *Lepidosternopsis*, based on two females from Pará, Brazil. Now we described the male of this genus for the first time. *L. irradiata* differs from all the known species of the genus, because it is macropterous with fore wings having only the median cell closed and radial vein absent.

ACKNOWLEDGMENTS

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